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**Living Arts**  
**Social Innovation Fund Grant Final Report**

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**Executive Summary**

Living Arts' Detroit Wolf Trap Early Learning Through the Arts program implemented Wolf Trap early learning programs in Head Start centers from 2012-2017, under the Social Innovation Fund (SIF) Grant. The SIF is a 5-year Federal Grant under the Corporation for National & Community Service designed to engage projects that “find what works and make it work for more people.” For Living Arts, a subgrantee of the grantee United Way of Southeast Michigan, the SIF was used to deliver arts-infused

classroom residencies, professional development, and family workshops to thousands of children, teachers, and parents in Detroit early childhood settings. Living Arts continues to deliver this program despite the end of the grant in 2017. Detroit Wolf Trap teaching artists collaborated with classroom teachers to deliver arts-infused residencies to each classroom. Along with the teacher professional development embedded in residencies, participating Head Start teachers also attended professional development workshops led by Detroit Wolf Trap teaching artists. Finally, Living Arts provided parent workshops for those who had children in intervention classrooms. The evaluation was conducted by Mary Lou Greene, Chair of the Visual Arts Department and Director of the Institute for Arts Infused Education at Marygrove College, and Dr. Shlomo Sawilowsky, professor of educational statistics and Distinguished Faculty Fellow at Wayne State University.

The confirmatory research question was: Does the Living Arts' Detroit Wolf Trap intervention have an impact on advancing school readiness in pre-kindergarten children ages three and four measured by HighScope *COR Advantage (COR-A)* instrument administered by classroom teachers?

The impact evaluation was confirmatory, meaning the intent of study was to demonstrate the effectiveness of Arts-Infused education, and to determine if the Living Arts' intervention had an impact on advancing school readiness in pre-kindergarten children ages 3 & 4, as measured by the HighScope *COR-A* overall and to determine if there was a link to the results with others in the field showing the impact that the arts have on language development/emergent literacy (Phillips, Gorton, Pincotti & Sachdev, 2010), emotional health (Grytting, 2000; Gregoire & Lupinetti, 2005; Lobo & Winsler, 2006; Menzer, 2015; USDHHS, 2003), and attention/decoding (Strait, Parbery-Clark,

Hittner, Kraus, 2012). The targeted level of evidence was moderate. The analysis of the *COR-A* data was based on a series of ANCOVAs on the post-test score with the pre-test score serving as the covariate for intervention and comparison Head Start (or Great Start) students.

Due to many factors including (a) the use of a different version of the *COR* prior to the release of the *COR-A*, (b) a change in plans for Living Art's anticipated partnership with Detroit Public Schools and (c) low comparison pools, Project Years 1-3 data, although promising, was not robust. These obstacles could not have been avoided, as the evaluators and the primary organization were not in control of comparison partners. In Project Years 4 & 5, we were able to gather a large reservoir of comparison students using the same instrument as the intervention group thus allowing for comparison on the student level and randomized selection after matching based on primary demographics (Project Year 5 data were available for  $n_1 = 517$  students in the Living Arts program and  $n_2 = 1,291$  in the comparison group). The reports show that in Project Year 4 the Living Arts Detroit Wolf Trap intervention had a medium effect size across all subscales of the *COR-A* as well as the total *COR-A* score. In Project Year 5, the effect size was slightly reduced, but showed that intervention students scored significantly higher than comparison students on five of the *COR-A* subscales and the total score.

The results of the current study confirm the impact that the arts have on early learning and reflect the findings of numerous other studies. The presence and intervention of the Living Arts Detroit Wolf Trap resident artist successfully increased students' Approaches to Learning; Social and Emotional Development; Language, Literacy, and Communication; Science and Technology; and Social Studies scores on the *COR-A* as

compared with students who did not have this program in their schools. The LADWT students also had higher *COR-A* Physical Development and Health, Mathematics, and Creative Arts subscales scores, although they were not statistically significant (in Year 5). In Year 4, students scored significantly higher in all domains and on the overall score.

In addition, through teacher qualitative responses to post-intervention surveys, it is clear that the Living Arts Detroit Wolf Trap intervention has made a systemic change to the teachers' pedagogy.

### **Introduction**

Children are born ready to learn in kindergarten and form 85% of their intelligence and personality by age five. Those first years of life are the most important for lifelong development (NRCIM, 2000) and preschool achievement is a predictor for later school success (Ramey & Ramey, 2004).

Although there are numerous studies on the positive impact Head Start has for low socio-economic status (low-SES) pre-K children, those same studies also recognize that despite the gains they make, Head Start children enter kindergarten still substantially below national averages on assessments (USDHHS, 2003). In 2006, the US Department of Health and Human Service Administration on Children, Youth and Families reported Head Start attendance alone does not eliminate elementary school achievement gaps (ACYF, 2006). Also, at-risk students often are stressed while in school and that leads to emotional barriers to learning as well as loss of attention (Willis, 2008). The arts, in combination with Head Start, can assist in closing the literacy gap as well as developing skills for emotion regulation.

**Getting “Ready To Learn in Kindergarten” Through the Arts**

Much of what young children do as play, including singing, drawing, dancing engages the senses and helps the brain get ready to learn in kindergarten. They develop thinking tools needed in early learning, including pattern recognition and development; representations in multiple cognitive arenas; and observation skills among others (Sousa, 2006). Many studies indicate that arts enrichment may provide important opportunities for children of varied developmental levels to grow in pre-academic skills (Gregoire & Lupinetti, 2005).

Wolf Trap Foundation for the Performing Arts’ Institute for Early Learning Through The Arts, based in Virginia, offers training to artists in Wolf Trap affiliates around the country in best practices in arts integration for early childhood settings. The Institute also offers professional development to pre-K teachers integrating performing arts into their teaching around the nation. Several research studies conducted with Wolf Trap have shown that this methodology has promise for improving student outcomes (Burnaford, 2007; Goff & Ludwig, 2013, Rabkin & Redmond, 2004).

The Wolf Trap Institute’s approach to early learning through the arts targets key indicators in early childhood development at every stage of early childhood: Infant, Toddler, Pre-K, and Kindergarten. The program trains artists to understand cognitive, physical, and social-emotional abilities of children each of these stages and then to develop and use arts strategies in drama, music, and movement to stimulate developmentally appropriate learning. The program serves individuals from 3 mos-6 years of age, though, for this study, only the Pre-K groups in Detroit Head Start settings were evaluated. A recent study of the Wolf Trap program model in

professional development and the use of performing arts integration in mathematics instruction showed the following: 1) the intervention positively impacted the teachers' use of the methodology in their classrooms, and 2) student outcomes in mathematics were positively impacted (the average student's math rank increased by 7-8 percentiles) (Ludwig, 2015).

A quasi-experimental study conducted in two Pennsylvania preschools, an artsintegrated school and a traditional school which were both Head Start programs serving low-income students, showed that at-risk students in an arts integrated preschool showed statistically significant improvements in Language and Literacy, Approaches to Learning, Creative Arts and on the Overall Early Learning Standards Inventory test than a comparison group (Phillips et al., 2010).

This study in arts integration, a series of ANCOVAs on the post-test score with the pre-test score serving as the covariate for intervention and comparison students, is to add further information to the strength of the methodology in impacting three early childhood indicators of future academic success: 1) emergent literacy, 2) socialemotional learning and 3) executive attention/decoding. The target level of evidence was moderate.

***Emergent Literacy:*** “Emergent literacy” refers to early knowledge about language, reading, and writing most of which is acquired during preschool. Early literacy is particularly important among school-readiness skills because instruction and learning in formal schooling is typically language-reliant (Phillips et al., 2010).

An accurate predictor of school success, for example, is the number of book words a child has in their vocabulary at age five, because it is during the early childhood

period when the foundation is laid for language development (Gee, 2008). Although Head Start does close the gap in letter recognition and other pre-reading skills, students are still behind the national average upon entering kindergarten (USDHHS, 2003).

All of the arts, especially music, support emergent literacy skills for children. , Students specifically engaged in music practice demonstrate increased emergent literacy skills. A meta-analysis of peer-reviewed music training was conducted in 2015 and found modest gains in phonological awareness that echoed several other studies and that there are correlations between music aptitude and phonological skills in children. Further, music training strengthens basic auditory and speech processing, which in turn influences phonological perception and reading skills (Tierney & Kraus, 2013). Similarly, 4- and 5-year old children showed that the more music skills children had, the greater their phonological awareness and reading development skills (Sousa, 2006).

***Social-Emotional Learning:*** Over 40 years ago, a study of differential emotion theory and its effect on learning (Izard, 1971) showed Head Start programs promote skill building exercises for positive emotion and emotion regulation for low-income children (Brown & Sax, 2011). Although Head Start aides students in adjusting their behavior and regulating emotions (USDHHS, 2003), many current studies suggest that the arts particularly help children dealing with poverty create positive social-emotional outcomes (Menzer, 2015) and promote regulation of emotions and behavior (Lobo & Winsler, 2006; Grytting, 2000; Gregoire & Lupinetti, 2005). A study specifically investigating arts programming and the impact on pre-school students showed that they exhibited more

positive emotions (interest, happiness, pride) and greater emotional regulation (Brown & Sax, 2011).

The National Endowment for the Arts (Menzer) conducted a literature review and gap-analysis of studies from 2000-2015 on the social and emotional benefits of participating in the arts. Specifically, the study looked at three areas: prosocial behaviors (i.e., helping, sharing, cooperation, empathy), reductions in internalizing behaviors (i.e., shyness, inhibitions) and externalizing behaviors (aggression).

One study showed an advantage in receptive vocabulary for students involved with an arts program partly because it provided opportunities for children from risky environments to regulate emotions and behavior (Brown, 2008). Children-specific arts disciplines also showed positive impacts of the arts on social-emotional learning: children in a dance program had a reduction in internalizing (shy, anxious) and externalizing (aggressive) problems (Lobo & Winsler, 2006), and children who participated in a drama-based education program saw decreases in disruptive behavior and improved selfregulatory behaviors, compared with children who did not participate in the program (Nicolopoulou et al., 2009). Similarly, toddlers in another study of an arts integration program, compared with a matched-control group, showed improvements in teacher-rated positive and negative emotion regulation. Brown & Sax (2013) suggest:

“...integrating the arts into early childhood education for lowincome children may serve to equalize educational opportunity by making the school experience more positive and by increasing the frequency of positive emotions and emotional regulation that children experience through the arts. The induction of positive emotions into

educational settings through arts programming is an important piece of prevention strategy, and arts-integration may play a significant role in early education programs for low-income students.”

Pretend play and socio-dramatic play also have shown its impact on emotion regulation in preschoolers. In a recent study, using the Emotion Regulation Checklist (Shields & Cicchetti, 1997), a parental report tool, students who were better able to manage emotions were more eager to pretend play. They were also more fluent and flexible in divergent thinking skills and were rated as having higher emotion regulation by their parents (Hoffman & Russ, 2012)

***Attention and decoding:*** Difficulty in distinguishing sounds in noise has been associated with delayed neural response and decreased encoding of speech (Anderson, Chandrasekaran, Skoe, & Kraus, 2010; Song, Skoe, & Banai, 2010.) Just as learning is language-reliant, it also often occurs in noisy environments. Accurate speech perception in noise is a critical component of early childhood education (Strait et al., 2012). In a study by Storch and Whitehurst (2002), vocabulary skills in prekindergarten later impact oral language skills. Further language and decoding skills at 4.5 years have direct and indirect impacts on Grade 3 reading comprehension (NICHD Early Child Care Research Network, 2005).

A study in Greece (Theodotou, 2015) reported that the “majority of the children involved in the literacy activities, which were derived through their interactions with the arts, were totally concentrated, showing signs of sustained intense activity.” In addition,

the study found that children showed stronger determination to reach goals and showed eagerness to continue activities.

### **Purpose of the Study**

Since 1996, Living Arts has delivered arts infused residencies to children in Pre-K and Kindergarten classrooms under the program name “El Arte Early Learning.” In 2013, Living Arts became an affiliate of the Wolf Trap Institute for Early Learning Through the Arts, adopting the Wolf Trap program model and approach, and trained the first cohort of artists using that model. The El Arte Early Learning program would eventually adopt its new name as the affiliate Detroit Wolf Trap--Living Arts’ program for early learning through the arts. The Wolf Trap Institute, based in Vienna, VA provides arts-based teaching strategies and services to early childhood teachers, caregivers, parents, and their children through the arts strategies in of drama, music, and movement. The Wolf Trap Institute, established over 30 years ago, is a program of the Wolf Trap Foundation for the Performing Arts. While the Institute has had numerous research studies conducted on their methodology, this new affiliate had not. The researchers were particularly interested in further data on the impact of arts-integration on low-SES youth through the Living Arts Detroit Wolf Trap in regards to emergent literacy, emotion regulation, and executive attention/decoding.

Living Arts, a non-profit arts and education organization, engages Detroit youth, teachers and families in transformative experiences in the performing, visual, literary and media arts. Through artist residencies in K-12 schools and early learning centers across Detroit and out-of-school offerings focused in Southwest Detroit, Living Arts increases

youth's academic achievement, develops leadership and artistic skills in young people, and strengthens schools and communities.

As part of their work in early learning communities Living Arts brings arts infused education to partners serving students in mainly Head Start (Pre-K) classrooms as well as in Early Head Start (Infant-Toddler) and Kindergarten classrooms throughout Detroit . Living Arts also serves families with children ages 3 months-6 years old in an out of school setting through this model. This study focuses on pre-k in Head Start programs. All programming is geared toward ensuring that children enter school “ready to learn in kindergarten”. The program includes direct service to children, their teachers, caregivers, parents, and teaching artists through mini-residencies, teacher training, artist training, and family workshops (see Table A1, Appendix).

1. Residencies: The residencies consist of sixteen 30-minute sessions, two per week for 6-8 weeks, in the classroom. There is one Teaching Artist assigned to each classroom to ensure consistency over the 8-week period (typical session is shown in Table A2 and teacher survey data A3, Appendix).

2. Individual Teacher Trainings: After each session, the Teaching Artist and Classroom Teacher meet for approximately 15-20 minutes to deconstruct the lesson, highlight successes and challenges, and plan for future sessions. Embedded in each residency are two planning sessions consisting of (a) the Teaching Artist and classroom teacher preparing arts integrated lesson plans, and (b) two classroom-teacher-led sessions in the classroom utilizing the arts strategies demonstrated over the course of the residency. During these sessions, the Teaching Artist actively coaches and assists with the lessons.

3. Professional Development Trainings for teachers: Professional Development for Classroom Teachers is a key component of the program. In addition to the individual debrief meetings with Teaching Artists, every early childhood teacher with a residency in their classroom is eligible for a three-hour professional development workshop provided by Living Arts Detroit Wolf Trap (see teacher surveys A4, Appendix).

4. Teaching Artist Trainings: Living Arts provides a comprehensive, hands-on 30hour training for new Teaching Artists with a Wolf Trap National Trainer. The training consists of a mini-residency where the trainer and trainees are physically in a classroom with children for 30 minutes per day. Training artists observe the Trainer using the Wolf Trap model and, after the observation, devote 4-5 hours with the Trainer to deconstruct their observation, develop their teaching tools (i.e., lesson plans) and learn strategies to take into the classroom. This training is required before a teaching artist begins to work in classrooms.

5. Family Involvement Workshops: For every five residencies contracted by a school, Living Arts offers a Family Involvement Workshop to engage parents and children together in a series of activities typical in the classroom residency. Parents leave with a worksheet of activities and songs to use at home (see parent workshop data, Table A5, Appendix).

**Evaluation:** Marygrove College Institutional Review Board approved the study without complication. As stated in the approved SEP, the following were the overall intentions of this research:

Implementation Evaluation: The implementation evaluation included measurement of the number and length of sessions delivered in classrooms, the number of professional development sessions as well as their length and number of participants, the number of family engagement sessions as well as their length and number of participants. This data was administrative data collected and reported by Living Arts.

Impact Evaluation:

*Confirmatory:*

The intent of the proposed research project was to examine the following hypotheses to demonstrate the effectiveness of Arts-Infused education:

Does the Living Arts' Detroit Wolf Trap intervention have an impact on advancing school readiness in pre-kindergarten children ages three and four measured by HighScope *COR-A* instrument?

*Exploratory:*

1. Does the teachers' use of the arts-infused strategies, after the Teaching Artist residency, indicate systemic change in instructional delivery?
2. Are parents using the arts-infused strategies at home with the children in the programs?

The data, collected by Living Arts, included High Scope *COR-A* Time 1 (administered approximately October) and Time 3 (administered May-June) records for intervention and comparison student (delivered digitally), Teacher Surveys (hard copy and online), Professional Development surveys (hard copy) and Parent Workshop surveys (hard copy). All materials delivered by Living Arts in June.

### **Implementation Evaluation**

The program has, by and large, remained consistent over the 5 years of the program, but has seen numerous challenges from outside entities in terms of intervention participants. Implementation data was delivered to evaluators through Living Arts, which recorded administrative data. Implementation numbers can be seen in Table A1 in the Appendix.

The number of classrooms and students fluctuated annually. Project Year 1 was impacted by Detroit Public Schools' inability to continue with the project. Due to this change in plans, Living Arts was no longer able to access the intervention and comparison classrooms originally anticipated. Additionally, Living Arts was unable to deliver the professional development to teachers, as intended originally. These changes necessitated an alternative plan of obtaining comparison classrooms from classrooms that had the intervention in prior years, or, what are known as "contaminated" sources. In Project Year 2, the number of intervention classrooms was low, some classrooms had a very small sample size, and schools were using a different version of the COR (and the new *COR-A*) instrument that contained differing items and subscales. In Project Year 3, all of the schools were migrated to the *COR-A*, but, responsive to CNCS input, the study was based on classrooms as the unit of measurement, not the student, because the randomization was based on selection among the pool of comparison classrooms. In contradistinction, in Project Years 4-5, there were sufficiently larger sample sizes of comparison students available, so the unit of analysis changed from the two groups' class means to the students' level (see impact evaluation below).

Fidelity to dosage (frequency and duration) quality, differentiation, and responsiveness, remained constant for the in-class residency intervention across all five years, as reported through administrative data, as did the extensive training, as described above, for the teaching artists. The residency dosage was consistently 16 sessions per classroom throughout the school year. The sessions were delivered twice a week for approximately 6-8 weeks. Training for artists was consistent annually and aligned with requirements from the Wolf Trap Institute, which requires intensive hands-on training by a national trainer for new artists, along with continued professional development for experienced artists.

The 3-hour professional development workshops for teachers were offered 1-3 times annually, depending on school plans. Project Year 5 was the only year required to present Professional Development survey data as indicated in the SEP. The three sessions were well attended reaching 95 teachers, in total. The attendance was mostly split between assistant teachers and Early Childhood Educators (Lead teachers). One workshop had a majority of teachers who had attended other Detroit Wolf Trap Professional Development workshops, in the 2nd workshop the majority had not previously attended another workshop, and the third was fairly split between those who had attended another workshop and those who had not. A large majority of teachers in all three workshops reported the information was very useful and they were comfortable using the techniques (see Table A4). Teachers comments included the benefit of alignment with the COR, the innovative teaching methods for math, and the high level of engagement of students.

The planning meetings and debriefs remained consistent annually. The overall rating from the teachers of the intervention was very high in Project Years 4 and 5 (see Table A3). The teachers rated the intervention closely aligned with the *COR-A* and indicators with the lowest score on weekly use of Science and Math concepts. There was almost unanimous indication that the teachers will use the strategies in the future pointing to the systemic change that the intervention has had on their teaching pedagogy.

Parent workshops were also consistently offered although fewer in Project Year 5 (see Table 9A). The self-report survey indicated that parents consistently understand that the arts support learning and that they will use the methods at home.

Living Arts was responsive to research needs and was diligent about distributing and collecting surveys from all workshops and professional development trainings to the best of their ability. In addition, they were instrumental in collecting administrative data *COR-A* reports from the many schools working with them to format it correctly for analysis. Confidentiality was protected for each child using student ID numbers and information was delivered to evaluators digitally.

Although comparison classrooms did receive comparable interventions in Project Years 1 and 2, Project Years 3-5 presented more ideal circumstances for obtaining and organizing data and also did not include any contaminated data. The appropriate school officials were contacted by Living Arts' Detroit Wolf Trap staff to ensure there was plans for continued participation, and there were no changes to High Scope's version of the assessment (which occurred in previous years, due to three versions still in use at that time). The same staff also handled scheduling resident artists and their attendance was monitored to ensure full participation in the program. Soon after the initial data collection

(i.e., "Time 1 administration"), the data files were transmitted electronically from the sites to the staff that, in turn, transmitted them to the program evaluators. The data were uploaded to SPSS (ver. 24), and checked to ensure the proper fields were populated. Preliminary analyses (not memorialized) were conducted to ensure data integrity. Although there was a Time 2 administration, as noted in previous years this information was collected but not used, because it would not have reflected sufficient time for the intervention to have an effect. The program evaluators regularly communicated with the LA staff regarding the timeliness of the third administration ("Time 3"), to ensure a final report could be conducted as expeditiously as possible. Because the school data were not made available until late June, a no-cost extension was requested to be able to analyze the data and prepare a final report.

## **Impact Evaluation**

### **Reliability**

In the final year of the project, Cronbach Alpha (CA), a measure of internal consistency reliability, was computed for the 34 item *COR-A*, with  $N = 712$ , comprising of the Living Arts Wolf-Trap and comparison students. CA for the *COR-A* pretest (Time 1 Assessment) Total Score was .954, nearly identical in Project Year 4 and consistent with the reliability of .968 obtained in Year Three, the first year of the project in which the *COR-A* was used. (In previous years, the *COR*, a precursor to the *COR-A*, was used.) The posttest *COR-A* Total Score reliability was .964, consistent with .970 and .982 for Project Years 4 and 3, respectively. The subscale reliability estimates for the current year, corrected to full-scale length of  $N = 34$  items with the Spearman-Brown prophecy

formula, are presented in Table 3 below. As was the case in Project Year 3 and 4, based on commonly used rules of thumb, all reliability estimates are considered to be extremely high.

Table 3. Cronbach Alpha (CA) and Spearman-Brown (SB(N)) Estimates of Reliability for the *COR-A*

	<i>COR-A</i> Subscale							
	<i>AL</i>	<i>SED</i>	<i>PDH</i>	<i>LLC</i>	<i>M</i>	<i>CA</i>	<i>ST</i>	<i>SS</i>
#Items	3	5	3	7	5	4	4	3
Pretest								
CA	.707	.792	.556	.833	.780	.753	.772	.684
SB(34)	.965	.963	.934	.960	.960	.963	.966	.961
Posttest								
CA	.767	.810	.658	.854	.854	.779	.792	.743
SB(34)	.974	.967	.956	.966	.975	.968	.970	.970

*Notes: AL* = Approaches to Learning, *SED* = Social and Emotional Development, *PDH* = Physical Development and Health, *LLC* = Language, Literacy, and Communication, *M* = Mathematics, *CA* = Creative Arts, *ST* = Science and Technology, and *SS* = Social Studies.

**Data Analysis**

As noted above, in the first three years of the project it was not possible to randomize students to group, or to match students to make groups comparable on specified control variables. Therefore, the element of randomization was based on comparing classroom means of groups randomly selected from the comparison pool, with the classroom mean used as the unit of analysis. Beginning in Project Year 4, however, a larger reservoir of students at comparison sites became available, changing the approach to randomization.

The disadvantage was information on classroom breakdown per site was not available. This was mitigated, however, by the large number of students available, making it possible to match based on age and gender, and ethnicity. Care was taken to choose comparison classrooms from high-poverty areas of Oakland County that were comparable to the Detroit intervention classrooms. (Note that some students in the Living Arts Wolf Trap group were in ½ day programs, whereas all students from the comparison group were in full day programs.)

Initially, in Project Year 5, data were available for  $n_1 = 517$  students in the Living Arts program, and  $n_2 = 1,291$  in the comparison group, similar to the breakdown in Project Year 4. Because only  $n = 15$  (2.9%) students' ethnicity in the Living Arts Detroit Wolf Trap group were White, Asian, Two or more, American Indian/ Alaska Native, or Native Hawaiian/Other Pacific Islander, these cases were removed from both the intervention and comparison groups. Hence, the ethnicities represented in the data analysis were Black/African American or Hispanic/Latino.

Additional students who were deleted from the analysis were comparison students with an age code of 0 – 12 months, 13 – 18 months, 24 – 32 months, 3 years old, and not specified to match the intervention group. Also, students from both groups who were coded as IEP/IFSP were deleted from the analysis. Hence, for the purposes of all analyses below, there were  $n_1 = 424$  students in the Living Arts Wolf Trap group, and  $n_2 = 406$  students in the comparison group, a reduction in sample size of about 43% from Project Year 4. Note that due to missing values either on the *COR-A* pretest (i.e., Time 1 administration) or *COR-A* posttest (i.e., Time 3 administration), the sample sizes change depending on the specific analysis conducted

The demographic breakdown for the Living Arts Wolf Trap and comparison groups are compiled in Table 4 and Table 5.

**Table 4. Gender, Ethnicity, and Primary Languages of Living Arts Detroit Wolf Trap and Comparison Students.**

	Gender		Ethnicity		Primary Language		
	Female	Male	Black/African American	Hispanic / Latino	English	Spanish	English & Spanish
LADWT	215 (50.7%)	209 (49.3%)	257 (60.6%)	167 (39.4%)	292 (68.9%)	98 (23.1%)	34 (8.0%)
Comparison	193 (47.5%)	213 (52.5%)	309 (76.1%)	97 (23.9%)	350 (86.2%)	26 (6.4%)	30 (7.4%)

**Table 5. Gender, Ethnicity, and Primary Languages of Living Arts Detroit Wolf Trap and Comparison Students.**

	Age Group		Program	
	4 Year old	Kindergarten	Full Day	½ Day
LADWT	264 (62.3%)	160 (37.7%)	273 (64.4%)	40 (9.4%)
Comparison	228 (56.2%)	178 (43.8%)	406 (100%)	0 (0%)

As was the case in Project Year 4, Fisher's exact test based on gender was not statistically significant ( $p = .361$ ). Whereas in Project Year 4 there was a statistically significant difference based on age code, in Project Year 5 there was no statistically significant difference ( $p = .073$ ). There was a statistically significant difference based on ethnicity, however, with a larger number of Hispanic/Latino students in the LADWT group, and a larger number of Black/African American students in the comparison group ( $p = .000$ ).

Based on a Chi-squared test, there was a statistically significant difference in the breakdown between full and ½ day programs ( $p < .000$ ). In addition, the comparison group had a statistically significantly larger proportion of students whose primary language was English as opposed to either Spanish or bilingual (English & Spanish) ( $p = .000$ ).

The analysis of the COR-A data is based on a series of ANCOVAs on the posttest score (data obtained at “Time 3” administration on the academic calendar), with the pretest score (“Time 1” administration) serving as the covariate. In Project Year 4, the LADWT group had statistically significantly higher scores on the *COR-A* total score and all subscales, with a mix of effect sizes (partial eta squared) from small to medium. For Project Year 5 that general trend continued. Table 6 contains the results for the *COR-A* Total Score as well as broken down by each *COR-A* subscale. Children who received Living Arts’ Detroit Wolf Trap scored statistically significantly higher than the comparison students on 5 of the 8 *COR-A* subscales, and scored statistically significantly higher on the *COR-A* total score. The subscale average effect size was .02. Although there is no absolute standard for interpreting this measure of effect size, the de facto interpretation is 0.01 is small and 0.08 is medium. Therefore, the average effect size of the Living Arts intervention for the significant subscales and total score is a slightly above small. The English language description of effect sizes from .01 to 2.0 are taken from Cohen (1988) and Sawilowksy (2009).

	<i>AL</i>	<i>SED</i>	<i>PDH</i>	<i>LLC</i>	<i>M</i>	<i>CA</i>	<i>ST</i>	<i>SS</i>	Total
LADWT	14.04	23.20	15.67	31.36	22.56	19.39	19.45	14.22	163.29
Comparison	13.53	22.48	15.55	30.31	22.27	19.13	18.11	13.85	158.28

Sample Size, ANCOVA $f$ , Statistical Significance (p value), and Effect Size (Partial Eta Squared)									
$n$ (Comparison)	394	377	401	387	384	377	382	393	347
$n$ (LA)	362	353	372	337	346	345	329	329	309
$F$	11.40	8.06	.61	11.22	1.54	1.30	42.28	5.63	10.74
$P$	.000	.005	.435	.001	.215	.255	.000	.018	.001
PES	.015	.011	n/a	.015	n/a	n/a	.056	.006	.016

*Notes:* LADWT = Living Arts Detroit Wolf Trap, PES = Partial Eta Squared. AL = Approaches to Learning, SED = Social and Emotional Development, PDH = Physical Development and Health, LLC = Language, Literacy, and Communication, M = Mathematics, CA = Creative Arts, ST = Science and Technology, and SS = Social Studies.

A graph of the *COR-A* Subscale scores, and Total Scores, for the Living Arts and Comparison group are presented below in Figures 1 and 2, respectively.

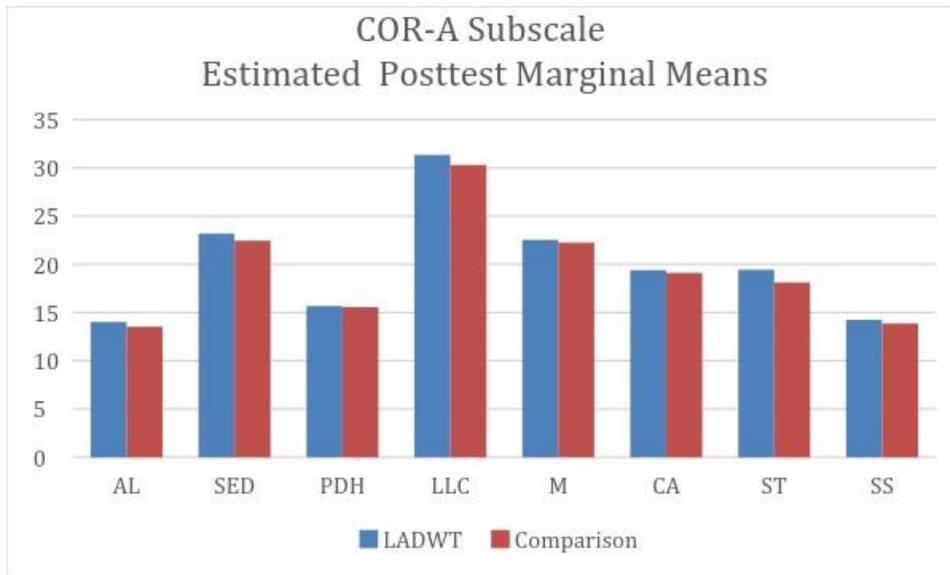


Figure 1. Living Arts Detroit Wolf Trap vs. Comparison Student *COR-A* Subscale Means

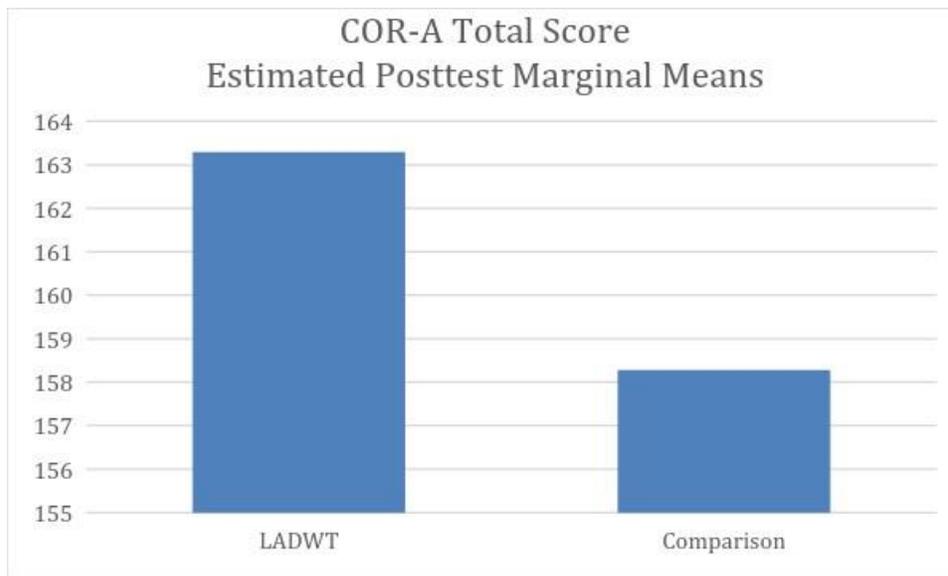


Figure 2. Living Arts Detroit Wolf Trap vs. Comparison Student *COR-A* Total Score Means

**Summary**

In contrast with Project Years 1 – 3, in both 2015-2016 and 2016-2017 it was possible to obtain a sufficiently large reservoir of comparison students to match based on

primary demographics. Hence, the unit of analysis is the individual student's *COR-A* score. The Living Arts Detroit Wolf Trap group had more students whose ethnicity was Hispanic/Latino, and the Comparison group had more whose ethnicity was Black/African American. As with Project Year 4, the comparison group had an advantage of more full day vs. 1/2 day program in Project Year 5. Similarly, there were a significantly larger proportion of students with English as the primary language in the Comparison group. Consistent with previous years, the HighScope's *COR-A* assessment tool was highly reliable, both in terms of total score and subscale score. The values for Cronbach's alpha, or the Spearman-Brown correction, measures of internal consistency reliability, were in the mid to up .9s, which is expected for a commercial grade instrument. Internal consistency is a measure of consistency of scores, which is a necessary condition for the validity of the purpose to which the instrument is used. For validity information, consult the users' guide:

[http://secure.highscope.org/productcart/pc/catalog/pdf/cor\\_userguideall\\_web.pdf](http://secure.highscope.org/productcart/pc/catalog/pdf/cor_userguideall_web.pdf)

In Project Year 4 the results indicated uniformity of success of the Living Arts Detroit Wolf Trap intervention for all *COR-A* subscales and *COR-A* total score. In Year 5, the LADWT group again scored statistically significantly higher on the total score, as well as on 5 of the 8 *COR-A* subscales. Based on the univariate analyses conducted, the magnitude of the effectiveness of the intervention, by conventional standards 4 those 5 subscales and the Total Score is slightly above a small effect size. For the *COR-A* Science and Technology subscore, the effect size was medium. This means the presence and intervention of the Living Arts Detroit Wolf Trap resident artist successfully increased students' Approaches to Learning; Social and Emotional Development;

Language, Literacy, and Communication; Science and Technology; and Social Studies scores on the *COR-A* as compared with students who do not have this program in their schools. The LADWT students also had higher *COR-A* Physical Development and Health, Mathematics, and Creative Arts subscales scores, although they were not statistically significant.

### **Conclusion**

The sampling plan in this study was a compromise between a random sample of treatment/ comparison students vs. a quasi-experimental design. The participants in the intervention group, the Living Arts Detroit Wolf Trap group, were fixed due to the nature of intact groups. However, a large reservoir of potential comparison students was obtained, and after reduction of non-matchable characteristics (e.g., Caucasian nonHispanics), the comparison group was constructed via random sampling from that reservoir.

Specifically, the Living Arts Detroit Wolf Trap and comparison students were not statistically significantly different based on gender or ethnicity. Other demographic proportions were of roughly equal proportion, although numerically favored the comparison group in terms of fewer Bilingual or Spanish as primary language students, and had older students (i.e., kindergarten age), as well as no known ½ day programs. In contrast, the Living Arts Detroit Wolf Trap group contained numerically fewer English as primary language students, fewer Kindergarten age students, and some students were in ½ day programs. Thus, where differences in the sampling plan existed they favored the comparison group (e.g., there were more students in the oldest of the three age codes), or

there is no literature known to us that differentiates on that demographic (e.g., gender) regarding the use of the COR-A. In a replication study, however, it would be of interest to construct both groups via random sampling.

The *COR-A* assessment tool was highly reliable in terms of Total Score and *COR-A* subscale scores (i.e., *COR-A* dimensions). The values for Cronbach's  $\alpha$  (and SpearmanBrown correction for attenuation of subscale size as compared with the total length of the test in terms of number of items), were generally in the mid to upper .90s, which is expected for a commercial grade instrument. These results also mitigate the potential concern for variation among the classroom teachers who administer the *COR-A*, although a subsequent study by HighScope or an independent researcher on the interrater reliability between classroom teachers and a single (or small group) of specially trained personnel to administer the *COR-A* might be of interest.

In Project Year 4 the results indicated uniformity of success of the Living Arts Detroit Wolf Trap intervention for all *COR-A* subscales and *COR-A* total score. In Year 5, the LADWT group again scored statistically significantly higher on the total score, as well as on 5 of the 8 *COR-A* subscales. Based on the univariate analyses conducted, the magnitude of the effectiveness of the intervention, by conventional standards 4 those 5 subscales and the Total Score are slightly above a small effect size. For the *COR-A* Science and Technology subscore, the effect size was medium. This means the presence and intervention of the Living Arts Detroit Wolf Trap resident artist successfully increased students' Approaches to Learning; Social and Emotional Development; Language, Literacy, and Communication; Science and Technology; and Social Studies scores on the *COR-A* as compared with students who do not have this program in their

schools. The LADWT students also had higher *COR-A* Physical Development and Health, Mathematics, and Creative Arts subscales scores, although they were not statistically significant.

In terms of getting students “Ready to learn in kindergarten,” as in previous studies where arts enrichment was shown to provide important opportunities for children of varied developmental levels to grow in pre-academic skills (Gregoire & Lupinetti, 2005), similar findings were obtained. The Language, Literacy, and Communication subscale (*emergent literacy*) in this study of the *COR-A* had an effect size of  $.042 \eta_p^2$  in year 4, and  $.015$  in year 5, demonstrating increased observed speaking, listening and comprehension, phonological awareness, alphabetic knowledge, reading, book enjoyment and knowledge, writing. These are all key elements of emergent literacy and are the cornerstones of our language-reliant educational system. Hence, students in arts-infused education visibly increase letter recognition, phonological awareness, and vocabulary acquisition (emergent literacy and attention/decoding).

A similar effect size,  $\eta_p^2 = .043$  in year 4, and  $.011$  in year 5, was obtained favoring intervention students on the *COR-A* Social and Emotional Development subscale (*emotion regulation*). The elements of that subscale include building relationships with adults, building relationships with other children, community, and conflict resolution. All of these are cornerstones of emotion regulation, a key indicator of future school success, especially for those living in poverty (emotional learning).

The implementation study reported consistently number of interventions in residencies, professional development trainings, and parent workshops. The classroom teachers involved are also highly engaged and found the teaching methodology to be

“very useful”. Many teachers have returned to professional development trainings often and a large majority report using the methodologies in their classrooms pointing to a systemic change in their pedagogy.

The methodology in this study is scalable, and the results indicate a positive impact on pre-K level children’s preparation for academic success. This study is a more rigorous echo of previous studies in language development and emergent literacy (Phillips et al., 2010; Sousa, 2006; Tierney & Kraus, 2013) and social-emotional development (Brown, 2008; Brown & Sax, 2013, Lobo and Winsler, 2006), and an expansion to other key areas of early childhood development such as mathematics, science, social studies, and physical development.

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## Appendix

Table A1. Implementation Data					
	Activity	#	duration (hours)	attendance	total contact hours
Year 1	Parent workshops	5	0.75	58	217.5

	Teacher professional development	1	1	39	39
	Sessions	16	0.5	780	6240
	Planning meetings		39		39
	Debrief sessions	not reported			
	Classrooms	39			
	Schools	11			
	Teaching artists training	not reported	35		35
totals		72	76.25	877	6570.5
Year 2	Parent workshops	13	0.5	135	877.5
	Teacher professional development	not reported			
	Sessions	50	0.5	260	6500
	Planning meetings	not reported			
	Debrief sessions				
	Classrooms	13			
	Schools	8			
Teaching artists training	not reported				
totals		84	1	395	7377.5
Year 3	Parent workshops	9	0.5	70	315
	Teacher professional development	3	3	81	729
	Sessions	14	0.5	800	5600
	Planning meetings	2	0.5	49	49
	Debrief sessions	14	0.25	49	171.5
	Classrooms	49			
	Schools	not reported			
	Teaching artists training	7	10	93	605
totals		98	14.75	1142	7469.5
Year 4	Parent workshops	5	0.5	107	535

	Teacher professional development	1	3	60	180
	Sessions	16	0.5	1380	11040
	Planning meetings	2	0.5	138	138
	Debrief sessions	14	0.25	138	483
	Classrooms	69			
	Schools	not reported			
	Teaching artists training	4	33	17	605
	<b>totals</b>	<b>116</b>	<b>37.75</b>	<b>1840</b>	<b>12981</b>
Year 5	Parent workshops	3	0.5	95	142.5
	Teacher professional development	3	0.5	58	58
	Sessions	16	0.5	920	7360
	Planning meetings	3	1	58	174
	Debrief sessions	12	0.25	58	174
	Classrooms	58			
	Schools	4			
	Teaching artists training	5	11	11	605
	<b>totals</b>	<b>83</b>	<b>13.75</b>	<b>1200</b>	<b>8513.5</b>
Total Parent Wkshops		40	2.75	465	2087.5
Total Teacher PD, meetings and debriefs		54	49.25	728	2234.5
Total Sessions		112	2.5	4140	36740
Total Classrooms		228			
Total Schools		25	many not reported		
Total Teaching artist trainings		16	89	121	1850
<b>Total</b>		<b>475</b>	<b>143.5</b>	<b>5454</b>	<b>42912</b>

*\*Attendance estimated at 20 students per classroom when not reported.*

Table A2. Typical Living Arts Detroit Wolf Trap Classroom Residency Session

Time	Activity	Purpose
5 min	Welcome Song	Consistent for every session.
15-20 mins	Focused Activity: movement, music, and literacy	Often inspired by an age-appropriate book (examples include: “Squirrels Busy Day” by Lucy Barnard and “Boot Weather” by Judith Vigna), these connect to a focused theme or curricular focus. (Example: The teacher is focusing on social emotional learning, especially self regulation/body control, and the teaching artist leads an activity where the children use their bodies to dramatize animal characters from a story.)
5 min	Ending song	To reflect and bring session to close
15-20 mins	Debrief with teacher	Discussing the arts strategies modeled, the successes and challenges of the session, and student needs. This informs the next session’s goals.

#### Examples of Literacy growth:

Year 4:

*“This child expanded his language by using the words “back” and “jump” that he learned in this activity.”*

*“One child expanded his language using colors that he wasn’t too sure of before.”*

*“This introduces the children to the alphabet as well as different animals.”*

*“One of our students is speech-delayed. We saw his vocabulary and speech getting better.”*

#### Examples of emotional growth:

Year 4:

*“One very shy child never wanted to participate or go in front of the others. After [the intervention], he volunteered a couple of times to act out a story in front of the class.”*

*“One child, more reserved, started becoming more interactive by the middle of the program.”*

*“One of our students is better able to control impulses.”*

*“One girl, who cannot sit still, sat through an entire lesson and participated with the group.”*

Attention:

*“My students were able to recall the sounds that letters make.”*

*“Students recalled details about the stories even 2 weeks later!”*

*“The singing helped the students to focus.”*

*“All of the children seem to be able to recall and re-tell the stories.”*

Table A3. Living Arts Detroit Wolf Trap Teacher Survey Responses									
Indicator of systemic change	Year 1 n=33			Year 4 n=62			Year 5 n=95		
What is music have you continued to use in your classroom	Although 93% of teachers reported use of the continued use of the strategies, they did not report which experiences they preferred.			Top 3 responses: “Steady Beat”(41%), “Hello Song” (17%), Chants (17%)			Top 2 responses: "Steady Beat" (46%), Chants (30%)		
What is dance experience have you continued to use				Top 3 responses: Body Part Isolations (30%), Physical Expression (29%), Moving Words (22%)			Top Responses: "Body expression" (53%), "Body movement" (39%)		
What is drama have you continued to use				Top 3 responses: “Bear Hunt”, "Pete, the Cat”, and Regie, the Rainbow”			Top responses: "Caps" (45%)		
Indicator of COR agreement	Always			Mostly			Sometimes		
	Yr 1	Yr 4	Yr 5	Yr 1	Yr 4	Yr 5	Yr 1	Yr 4	Yr 5
Was the content developmentally appropriate	55%	90%	82%	32%	5%	14%	13%	5%	4%
Was the delivery of content developmentally appropriate	49%	90%	85%	41%	5%	11%	10%	5%	4%

How often did your student COR notes come from these sessions	No report	87%	75%	No report	13%	22%	No report			3%	
	Yr 1	Yr 4	Yr 5	Yr 1	Yr 4	Yr 5	Yr 4	Yr 5	Yr 1	Yr 4	Yr 5
<b>Observation of COR element</b>		<b>Weekly</b>			<b>Monthly</b>		<b>Once a Yr</b>			<b>Never</b>	
Creative Representation	86%	82%	80%	11%	18%	16%		1%	3%		3%
Initiative	79%	74%	76%	15%	19%	16%	7%		6%		8%
Social Relations	83%	73%	83%	14%	20%	11%	2%		3%	5%	6%
Music & Movement	100%	97%	92%		3%	5%					3%
Language & Literacy	94%	90%	84%	6%	8%	11%		1%		2%	3%
Science & Math	69%	80%	74%	22%	13%	20%	5%		9%	2%	6%
		Yes				No					
<b>Indicator of systemic change</b>		Yr 1	Yr 4	Yr 5	Yr 1	Yr 4	Yr 5				
Will you use these strategies again?		93%	96%	97%	7%	4%	3%				

	Session 1 N=37		Session 2 N=19		Session 3 N=39		Totals
Assistant Teachers	50%		53%		36%		46%
Early Childhood Educators	47%		37%		56%		47%
Administration	3%						1%
Center Manager			10%		8%		6%
	Yes	No	Yes	No	Yes	No	
Have you attended other Living Arts Workshops in the past?	93% (30% had attended 2 or more and 13% had attended 5 or more)		7%	26%	74%	46%	54%
Was the information helpful?	93%		100%		97%		

Are you comfortable using these techniques?	94%		very few responses		97%	
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Table A5. Living Arts Detroit Wolf Trap Parent Survey Responses						
		Very Much			Somewhat	
Question	Year 1 N=58	Year 4 N=107	Year 5 N=16	Year 1	Year 4	Year 5
Did this workshop demonstrate a clear connection between the arts and its support of learning?	93%	100%	94%	7%		
Did this workshop give you information to support your child's learning outside a school setting?	86%	94%	88%	14%	6%	12%
Did the leader engage adults and children?	89%	99%	81%	11%	1%	19%
Will you use this again with your child?	y=93%	y=94%	y=94%	maybe=7%	maybe=6%	maybe=6%